DOCUMENT RESUME

ED 183 575 TM 010 074

AUTHOR Mitchell, Jimmy L.; McCormick, Ernest J.
TITLE Development of the PMPQ: A Structural Job Analysis Questionnaire for the Study of Professional and Managerial Positions. PMPQ Report No. 1.
INSTITUTION Purdue Univ., Lafayette, Ind. Dept. of Psychological Sciences.
PUB DATE Jul 79
NOTE 65p.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Administrative Personnel; Employment Qualifications; Factor Analysis; *Job Analysis; *Managerial Occupations; Multiple Regression Analysis; *Professional Personnel; *Rating Scales; Salaries; Task Analysis; Test Construction
IDENTIFIERS Position Analysis Questionnaire; *Professional Managerial Position Questionnaire

ABSTRACT

The development and analysis of the Professional and Managerial Position Questionnaire (PMPQ) is reported. PMPQ is intended to serve as a job analysis instrument for higher level occupations than those assessed by the Position Analysis Questionnaire (PAQ). Four approaches to job analysis are described with different emphases on the requirements of the work or the characteristics of the workers. The development of the PMPQ is based on work done for the PAQ plus other job analysis studies. A nine-point scale is used with verbal anchors for alternating scale points. The 93 scale items are classified in five categories: part-of-the-job, complexity, impact, responsibility, and special. The field administration is based on 300 cases from 29 sources in 17 states and represents approximately 45 different companies. Data from the administration are studied by a principal components analysis with orthogonal rotation and the resulting principal component scores are then used in a multiple regression analysis to predict salary. Dimensions of the analysis are interpreted to include planning and decision making on the job and background variables of experience and training. (CTM)

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Jimmy L. Mitchell and Ernest J. McCormick

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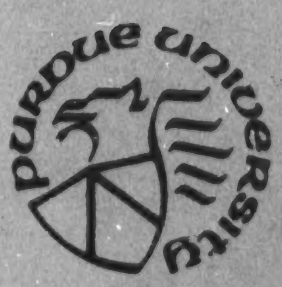

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PURDUE UNIVERSITY
INDUSTRIAL/ORGANIZATIONAL PSYCHOLOGY
DEPARTMENT OF PSYCHOLOGICAL SCIENCES

DEVELOPMENT OF THE PMPQ. A STRUCTURED JOB ANALYSIS QUESTIONNAIRE FOR THE STUDY OF PROFESSIONAL AND MANAGERIAL POSITIONS

by

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PMPQ Report No. 1
July 1979

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INTRODUCTION

The research reported in this volume represents the initial development of a new structured job analysis questionnaire designed for the study of executive, professional, and managerial positions. This effort was carried out as a part of the first author's doctoral program in the Department of Psychololgical Sciences, Purdue Univeristy, under the guidance and supervision of the second author. It represents a continuation of the line of occupational research which led to the development in 1969 of the Position Analysis Questionnaire (PAQ). Subsequent research by Harris and McCormick (1973) dealt with the use of a special form of the PAQ for research with Navy blue collar (enlisted) and white collar (officer) positions. Results suggested the possibility that a separate version might be needed for positions at the upper end of the worker-supervisor-manager-executive spectrum. This report deals with the development and initial administration of such an instrument which we have called the Professional and Managerial Position Questionnaire (PMPQ)*.

Background

A variety of job analysis systems have been developed during the last forty years which attempt the analysis, classification, and evaluation of all types of jobs and positions. At least four major lines of research have developed, each with its own particular orientation, strengths, and weaknesses. These four "schools" of Job Analysis include the following:

1. Functional Job Analysis (Fine and Wiley 1971, US Dept of Labor 1972) - This system developed out of the initial work of the United States Employment Service (USES) in the 1930s. The objectives of this program were primarily focused on the development of a classification scheme which could be used to describe jobs and identify the basic requirements or qualifications for each type of job. This data provided a standard system to be used by the USES, and the cooperating employment service of each of the states, in job referral. Aimed at assisting in the recovery from the depression and getting qualified people to where the jobs were, this system resulted in the development of the Dictionary of Occupational Titles (DOT) in 1939 (Shartle 1959). This initial DOT contained 17,452 occupations and included all types of positions (Blum and Naylor 1968:510). The DOT was revised in 1949 to define over 22,000 occupations and contained over 40,000 job titles. The 1965 version was published in two volumes: "Definitions of Titles" (Volume 1), and "Occupational Classification" (Volume 2). The USES system was expanded to include a "functional" analysis of all jobs in terms of their orientation to Data, People, and Things. These worker functions are considered to be hierarchies and could be assessed using defined scales of 6, 7, or 8 degrees (Fine 1963, 1967a, 1967b, 1968, 1973, and Fine and Wiley 1971). In addition to this scheme, jobs were also described in terms of worker traits, educational requirements, and experience required (US Department of Labor 1972). Recently, Fine et al. (1978) has attempted to move this system into

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the area of training requirements and curriculum development; however, its primary use remains as a standardized classification scheme useful, not only in the US Employment Service but also, by other governmental agencies and the Canadian government as well (Blum and Naylor 1968).

2. Human Engineering approach (Birt and Kimmerling 1978) - A second major approach to the study of jobs developed out of the needs of an increasingly complex technology. During World War II, an awareness of the interface between human requirements and equipment requirements was developed. Dr. Paul Fitts was involved in the laboratory study of the psychological aspects of equipment design problems and is said to be the first to call this "engineering psychology" (Birt and Kimmerling 1978:69). The Aeromedical Laboratory of the US Air Force at Wright Field, Ohio, was a major force in this development. Defining the technical specifications of a new aircraft system proved difficult unless the human requirements (for operators or repairmen) could also be specified with some degree of accuracy. This need led to considerable study of human sensory processes, information handling capabilities, and the adaptation of equipment or technological processes to enchance the man-machine interface. In addition, to make any weapons system cost effective, training programs and other system parameters had to be worked out even before a new system could be funded. As a result of these kinds of needs, behavioral scientists worked out a system of task analysis based on equipment capabilities, known human performance parameters, and projected system objectives. Given these kinds of information, the tasks and jobs of a new system could be forecast and, where necessary, appropriate job aids developed to maximize human performance (Gagne 1962). This line of job research has variously been called a "systems approach" (Ibid.), Human Factors (Folley 1960), Human Engineering (Chapanis 1959), or Ergonomics (McCormick 1964). In this approach, descriptions of tasks are more on the engineering level and task lists are often so detailed as to be overwhelming to the personnel technician, trainer, or personnel manager. Thus, the Human Engineering approach, while successful in terms of weapons system development, has had limited use in terms of meeting the classification, training, personnel management, and salary specification needs of industry.

3. Task Inventory approach (Morsh 1964, Christal 1974, Driskill 1975) - A somewhat related approach taken in the military services has been the development of a listing of tasks which might be performed in a job or set of related jobs and the gathering of quantitative information to permit assessment of those jobs. This system appears to have evolved out of both the human engineering approach outlined above and the work of Flanagan (1951) who developed the critical incidents technique to describe jobs. Work in the middle 1950s by Flanagan's successors at Lackland AFB, Texas, demonstrated that quantitative job information could be gathered reliably from job incumbents. Task lists were developed through group interviews with senior technicians and then administered to very large segments of the population of an occupation (Morsh and Archer 1967). The quantitative information gathered can, through the Comprehensive Occupational Data Analysis Programs (CODAP), be analyzed to provide a variety of data. Jobs can be clustered based on their similarity to reveal the natural structure of jobs in the field. This has implications for occupational classification, training, selection, promotion, and a variety of other management decisions (Driskill 1975; Turner 1978). In general, the Task Inventory approach, coupled with the analytic capability of CODAP, is one of the most powerful personnel management tools which exists

today. This approach is now used in all of the US military services and in Australia, Canada, and the United Kingdom. In the US, this approach has also been applied in other federal agencies and a variety of state and local governments as well as in private industry. Control Data Corporation (CDC) is developing a version of CODAP for civilian applications. The Task Inventory approach is restricted, however, to examining a group of related jobs (an occupation) - those which can be surveyed with a single instrument. Thus, the utility of this system for comparisons across disparate occupational fields is somewhat limited (Mitchell 1978a). Further, this approach is not cost effective with small populations. While this system is exceptionally strong, particularly in the study of variations within occupational fields or between closely related fields, it cannot meet the needs of industry for comparing all of the diverse jobs in a complex company or organization using a single, standardized instrument.

4. Worker-Oriented Job Analysis (McCormick 1976) - In contrast to the "task-oriented" job analysis program developed by the Air Force, the research program in occupational studies at Purdue University evolved as a structured job questionnaire of "worker-oriented" elements. Palmer and McCormick (1961) developed a worker activity checklist for the description of any job. Through the years, this checklist approach was expanded and refined to permit ratings for job elements. In 1969, McCormick, Jeanneret, and Mecham published the initial version of the Position Analysis Questionnaire (PAQ) which is a structured job analysis questionnaire consisting of 194 job elements. Any job can be described quantitatively in terms of these job elements or in terms of principal component scores for the underlying job dimensions . These dimensions, derived through principal components analysis and cross validated in the prediction of salary levels, have been further refined in subsequent research (McCormick, Mecham, and Jeanneret 1972).

In reviewing the state of job analysis in America, Prien and Ronan have noted that "The program of research conducted at Purdue University has produced results pertinent to many of the basic questions concerning job analysis (Prien and Ronan 1971:382)". They observed that one of the advantages of the PAQ system is that it is possible to go directly to worker or job performance evaluation and to the construction of selection and classification tests. They also note that job dimensions derived from studies of jobs with the PAQ can be described in terms of worker requirements, where this is not possible in task oriented job analysis systems (Ibid).

All of the work on the PAQ need not be summarized here. Details of the system are available from the basic monograph (McCormick, Jeanneret, and Mecham 1972), from related technical reports, from the Prien and Ronan (1971) review, and from a more recent statement by McCormick (1976). However, it is useful to note that when the PAQ was used to study 536 jobs representative of most levels and the resulting responses were submitted to a principal components analysis, five general dimensions were obtained. These included:

1. Having decision making/communication/social responsibilities
2. Performing skilled activities
3. Being physically active/related environmental conditions

4. Operating vehicles/equipment

5. Processing information

McCormick and Tiffin (1974) note that in addition, analyses of the job elements within the six divisions of the PAQ resulted in the identification of 27 more specific job dimensions. They observed that one of the marked advantages of this system is the quantification of job information in terms of job dimension scores. This quantification facilitates the evaluation and interpretation of job information but also permits a variety of other analyses between and across groups and occupational levels which is not readily achieved with other job analysis systems.

The PAQ system, like the Functional Job Analysis system of Fine, provides for the analysis and classification of all types of jobs. This level of generality has great potential for adding to our general scientific knowledge of the world of work, but carries with it the potential for difficulty with the study of particular subsets of occupations, particularly those which are generally called higher-level positions. And indeed, for all its major strengths, this is where the PAQ system encountered some difficulty.

Difficulties With Higher Level Positions

In a study of the use of PAQ job dimension scores for the prediction of salary levels with a sample of 340 jobs, Mecham and McCormick (1969) found that the range of misprediction was narrower for lower level jobs and was progressively larger at the higher salary levels. Thus, the prediction for these higher level jobs was much more unstable. While the multiple correlations for the overall prediction were quite high (ranging from .83 to .90), and held up under cross validation (.83 to .87), this instability at the higher end of the range of jobs is troublesome and hints that there is some problem in the use of the PAQ with higher level jobs.

Harris and McCormick (1973) used an adapted version of the PAQ to study enlisted and officer billets in the US Navy. In this study, job dimension scores were derived for a sample which included 607 enlisted positions and 249 officer positions. These researchers concluded that there were major differences between military compensation systems and civilian compensation in equivalent positions. Another conclusion of this report was that the Navy PAQ was a reasonable way to determine appropriate pay grades for enlisted positions but was somewhat "questionable" for the officer billets. Harris and McCormick pointed out that, "...it may be that the PAQ as such (as one form of structured job analysis questionnaire) is not sufficiently 'sensitive' to differentiate the billet-related distinctions that do exist between and among billets held by officers of different ranks" (Ibid:34-35). They recommended the development of a specialized structured job analysis questionnaire which would be more sensitive to differences between officer positions.

In another study, McCormick, DeNisi, and Marquardt (1974) used basically the same procedure as used earlier by Mecham and McCormick (1969) in predicting salary levels based on job component scores. In this study, a sample of 3,700 jobs was used, drawn from the 8,000 included in the basic principal components analysis for the PAQ (Marquardt and McCormick 1974). These job analyses came from 125 different organizations in a wide variety of

industries and from many geographic locations. The multiple correlations and cross validation coefficients clustered at about .64. In explaining the reduced correlations, the authors note that there was a marked inflation during the study period (1970 through 1974) which resulted in inconsistent jumps in compensation rates of various positions in the sample. This appears to be a reasonable comment which may partially account for the reduced mutiple correlation; however, some reduction in the degree of relationship would be expected as the sample was expanded over type of position, geography, and as the number of companies and types of organization (private, public, governmental, etc.) increased.

It is relevant to note that the instability in predicting higher salaries seen in earlier reports in replicated here. Data displayed in Figures 1, 2, and 3 of the McCormick, DeNisi, and Marquardt study reflect a marked departure of observed from predicted salaries when above $1,100 per month.

One other possible cause of this instability may be that the job component dimensions which are relevant to the description and analysis of all jobs are not particularly appropriate to the more specific purpose of job evaluation in the diverse subset of executive, professional, and managerial positions, as was suggested by Harris and McCormick in the Navy PAQ study. Job component weights derived from a general sample may seriously distort the prediction of salary in higher level jobs where such nebulous constructs as "responsibility" and "communication" are more important than the physical perceptual skills or manual dexterity needed in many blue collar occupations. Other research with the PAQ suggests that decision making is relevant to all levels of work, but it may need a particularly strong weighting for the prediction of salary in higher level jobs, which is not feasible with a general regression equation based on a sampling of all types of work.

Ceiling Effects

Another possible problem in dealing with professional, managerial, and executive positions is that there may be a ceiling effect on some of the PAQ scales. All of the PAQ scales are limited to a five-point, verbally-anchored rating scale format. In certain cases, this severely restricts the range of possible responses and may not be sufficiently discriminating at the upper levels. For example, PAQ item No. 46, Required Education, uses a five category scale where category 4 is defined as "College degree (degree requiring four years or more to complete, for example, B.A., B.S., etc.)" and category 5 is "Advanced degree (M.S., Ph.D., M.D., LLD., etc.)". While this scale is adequate to describe the required education level of most jobs, it would appear to be somewhat restricted at the upper range. There is no discrimination among the various advanced degrees.

However, the general education development needed to perform adequately in a position is quite probably a significant factor in the description of positions, screening of applicants, and in salary determinations, as has been shown in the research of Scott (1963) and in the USES-Department of Labor classification system. Lacking such discrimination at the higher levels, it is possible that predictions would be less reliable and less stable.

This brief review of the PAQ literature has focused on the problems involved in its use for the study of higher level jobs and has not highlighted the many positive aspects of the PAQ system. A review of the many valuable applications of this system can be found in McCormick and Tiffin (1974) or McCormick (1976). Additionally, studies undertaken in recent years suggest that for many management and executive positions, when the PAQ is used to derive a specific equation for such positions in a given sample, it is very adequate for predicting appropriate salary levels.

DEVELOPMENT OF THE PMPQ

Introduction

It is in this context that the proposal for the current project was developed in early 1976. The proposal suggested the development of a structured job analysis questionnaire in the tradition of the PAQ, but one which would be aimed more specifically at the relm of executive, professional, and managerial positions. Rather than just adapt elements of the PAQ for this purpose, our line of research was to review the psychological and management literature over the past forty years to identify those dimensions, factors, components, or contructs which seem to be important in higher level jobs.

Campbell, Dunnette, Lawler, and Weick (1970) outlined an appropriate approach to the study of management jobs. They stated, "What is needed is a set of fundamental dimensions to describe or measure the job behaviors desired at a particular time or for a given situation" (Campbell et al. 1970:99). They outlined a four step process of systematic obervation, rational or statistical analysis to discover categories or dimensions, trying out these dimensions with another sample of managerial jobs, and modifying these dimensions based on the new observations (Ibid:72).

In developing our plan of research, we decided to substitute a review of published reports on executives and managers for the observation step proposed by Campbell et al. Any direct observation could cover only a very limited sample restricted in terms of geography, time, and salary range. However, by sampling across the domain of published psychological and managerial studies, we could examine those factors, dimensions, components, or contructs which had been identified at different times, with different occupational areas, across various statistical methodologies, and across a variety of analysis techniques. In this way, it would be possible to identify many of the major variables relevant to higher level positions in such a way as to insure greater generalizability and, thus, more scientific validity.

Review of the Literature

One of the first formalized job analysis systems was that of Viteles, published in 1932 (cited in Blum & Naylor 1968:506). Viteles' Job Psychograph involved the specification of individual traits and abilities necessary for success in a job. In consisted of a standard list of traits which were rated on a five-point scale as to its importance for the job. The considerable influence of this pioneering work survives today in the form of trait ratings (cf. US Department of Labor 1972) and in the wide-spread use of 5-point importance scales (cf. Baehr 1967; or McCormick et al. 1972).

Barnard (1939) studied executive positions using a rational analysis to determine the requirements of such positions. He identified three essential "functions" which all higher level positions had in common: to formulate and define the purpose of the organization; to promote securing of effort essential to accomplishing the purpose; and to provide a system of communcation necessary for the accomplishing of this purpose (Barnard 1939; as cited in Prien and Ronan 1971).

Lawshe and Alessi (1946) identified factors which would predict the appropriate level of a job. Using a variety of factors, they found that a multiple regression using the factors of Responsibility, Manual Skill, and Working Conditions correlated highly (R = .98) with point values of a more elaborate system (Lawshe and Alessi 1946; as cited in McCormick and Tiffin 1974:420).

Flanagan (1949) was perhaps the first concerned with the identification of basic dimenisions of executive and scientific jobs; he developed his critical incidents technique to capture such dimensions with engineers and with military officers.

Fleishman (1953) studied leadership by factoring data on a variety of leadership activities and characteristics. His resulting production and consideration factors have greatly influenced the study of leadership and have resulted in the development of whole schools of leadership theory and training.

Williams (1956) studied executives using the critical incidents approach and developed a set of dimensions very similar to those of Flanagan. Shartle and Stogdill (1957) pioneered in the use of time allocation across a manager's responsibilities and activities. This approach was not generally accepted for civilian use but had an obvious impact of the military study of jobs.

Hemphill (1959, 1960) developed the first major job analysis instrument designed specifically for executives and his work has come to be considered as a classic. His Executive Position Description Questionnaire (EPDQ) resulted in the identification of ten factors underlying executive performance. Unfortunately, follow on research by others generally failed to replicate his factor structure (Prien and Ronan 1971) and a number of questions concerning his methodology have been raised. His factors appear to be a mixture of activities, personal characteristics, and social conditions which are difficult to interpret and use in specific job analysis applications. Most of his factors have recently been replicated in a extensive study by Tornow and Pinto (1976).

Mahoney, Jerdee and Carrol (1963, 1964) examined managerial performance across a set of eight types of specific activities. Their work is noteworthy in terms of their use of a consistent set of activities which could realistically be rated with a single rating scale. Baehr (1967) derived a set of twelve managerial factors using a structured questionnaire, a single importance rating scale, and a large sample of managers and executives. Her work was instrumental in validating the use of a structured questionnaire specifically designed for executives and managers.

Campbell et al. (1970) have reviewed most of the earlier research and attempted to pull together data on what managers do into a coherent theory of managerial behavior. As noted earlier, however, they concluded that the greatest need is the identification of a set of fundamental dimensions to describe and measure the job. From our review of the literature, there appears to be at least nine major types of contructs which were consistently identified as factors or components of executive, management, or professional positions. These are displayed in Table 1 (for a more detailed review of the literature, see Mitchell 1978b).

TABLE 1

IDENTIFICATION OF RELEVANT CONSTRUCTS

Generic Construct	Sources
Planning/Scheduling	Barnard (1938), Flanagan (1949, 1951), Rothe (1951), Williams (1956), Hemphill (1959, 1960), Helm (1961), USAF (1962), Prien (1963), Mahoney, Jerdee, and Carroll (1963, 1964), Christal (1965), Baehr (1967), Tornow and Pinto (1976).
Processing of Information and Ideas	Flanagan (1949), Helm (1961), Christal (1965), Fine (1967 and various other dates), Baehr (1967), Sprecher (1967), McCormick, Jeanneret, and Mecham (1969, 1972).
Making Judgements (Decision making, problem solving, evaluating, etc)	Flanagan (1949, 1951), Rothe (1951), Jaques (1956), Roach (1956), Palmer and McCormick (1961), Christal (1965), Sprecher (1965), Baehr (1967), McCormick, Jeanneret, and Mecham (1969, 1972), Tornow and Pinto (1976).
Communicating	Barnard (1938), Flanagan (1949), Rothe (1951), Fleishman (1953), Helm (1961) Prien (1963), Christal (1965), McCormick et al. (1969, 1972).
Interpersonal Activities and relationships	Flanagan (1951), Rothe (1951), Fleishman (1953), Roach (1956), Williams (1956), Hemphill (1959, 1960), USAF (1962), Helm (1961), Prien (1963), Manhoney et al. (1963, 1964), Christal (1965), Baehr (1967), McCormick et al (1969, 1972).
Technical Activities	Williams (1956), Lawshe and Alessi (1946), McCormick et al. (1969, 1972).
Responsibilty	Lawshe and Allessi (1946), Flanagan (1949, 1951), Jaques (1956), Hemphill (1959, 1960), Prien (1963), Sprecher (1965), Baehr (1967), Fine (1967 and various), McCormick et al (1969, 1972), Tornow and Pinto (1976).
Personal Development	Flanagan (1951), Williams (1956), Roach (1956), Scott (1963), Christal (1965), Baehr (1967), McCormick et al (1969, 1972).
Personal Qualities	Fleishman (1953), Williams (1956), Roach (1956), Hemphill (1959, 1960), McCormick et al (1969, 1972).

* Adapted From Mitchell (1978b; Table 1, pp 63-65).

These nine constructs do not represent a consistent set of variables; rather, they seem to cluster into three different classes of variables. The first six constructs appear to be generic types of activities which are all involved, to some degree, in most higher level jobs. The seventh construct, Responsibility, is not an activity per se but yet it appears in many studies of higher level positions, particularly in job evaluation studies. It very frequently appears in research where job activities are also studied, and some researchers (such as Jaques 1956) seem to feel that it is the paramount issue.

The third class of variables are those which involve some aspect of the individual, either in terms of the individual's background preparation for the job (education, experience, etc.) or in terms of some type of personal quality or trait. Such variables appear mostly in descriptive studies, but they also occur in job evaluation systems or in studies where the objective is the prediction of individual job success.

The three classes of variables can be considered to result, in part, from the different objectives of the various job analysis studies. They may well represent three quite different aspects of any job: (1) the activities of the position, (2) the level of responsibility inherent in the position, and (3) the personal background or character needed to perform adequately in the position. In the current line of research, it was felt that these three classes of variables might well require different kinds of measurement.

Measurement Strategy

Job activities should be fairly straightforward to measure. The plan was to develop several items for each of the six job activities areas shown in Table 1, and then to have such items rated using a modification of Hemphill's Part-of-the-Position scale. Where Hemphill used a seven-point scale with only three verbal anchors (Hemphill 1959, 1960), our modification would increase this to a nine-point scale. This gives the maximum descrimination possible in a single digit number. A zero point was included to permit a rater to indicate the absence of an activity in a position, as has been done in many of the PAQ scales.

Three verbal anchors did not appear to be a sufficient framework to insure consistent and reliable responses. Thus, verbal anchors were developed for alternating scale points; this should provide sufficient structure for most raters. In addition, since our objective here is primarily a descriptive one (in terms of a quantitative description of job activities), the Part-of-the-Position scale was redefined to exclude any component of "Importance" or "Significance". Thus it was also retitled as the Part-of-the-Job scale, to distinguish it from Hemphill's original form, and was defined as, "the degree to which job activities are a part-of-the-job in a descriptive sense (amount of time spent, energy required, attention devoted, etc.)" (Mitchell and McCormick 1976). By stressing the descriptive nature of this assessment, it was hoped that the Part-of-the-Job ratings would be less multidimensional and less evaluative; logically this should enhance the probability of a reliable and consistent job description.

Development of the Instrument

Twenty-one questions were developed to describe various types of job activities identified earlier in Table 1. These were developed from various sources including the research studies reviewed, the PAQ, Hemphill's EPDQ, Baehr's (1967) instrument, Fine's FJA scales (Department of Labor 1972), and various Air Force studies. See Table 2, Outline of the PMPQ, for a complete listing of the items which were developed.

In addition, a parallel set of 21 questions involving the same activities areas was constructed which aimed at assessing the degree of complexity of each activity. This was done by using a 9-point complexity scale. Complexity is a rather concrete construct which has the potential for reliable measurement, as has been suggested by the work of Morsh and Archer (1967). The objective of its use was to assess each activity area in terms of its intricacy, comprehensiveness, and, by implication, its "level" of responsibility.

In trying to deal with the concept of "level of responsibility," we recognized the inherent difficulties in having job incumbents, supervisors, or job analysts rate such a variable. In the Air Force line of research dealing with task factors, it has been demonstrated that raters are capable of rating the relative difficulty of tasks within their own occupational fields; however, such ratings cannot readily be compared across occupations if there is no common frame of reference with which ratings in one occupation can be unequivocally equated with those of another occupation. Tasks which may be difficult for one group may be trivial for some other group.

To deal with this type of rating variance, it is necessary to establish in the mind of the raters a common frame of reference (which is the objective of the whole line of research which led to behaviorally-based rating scales; Smith and Kendall 1963). Thus, it was considered necessary in the present project to develop anchors for the complexity scale which could be illustrated with specific examples of behaviour for each activity item.

Behavioral exmaples suggestive of various levels of complexity of each activitiy were generated from the previous literature, from a class of seniors and graduate students in industrial psychology, from a similar class of business students, and finally from a panel of graduate students in industrial psychology who were involved in a project to develop a comprehensive management training program for a major utility. These incidents were displayed in random order and were then rated, using a nine-point complexity scale, by industrial psychologists in business, government, and the academic world. These raters were primarily alumni of the Purdue Industrial/ Organizational Psychology program (1951-1976) who were located through the alumni files of the Purdue Association of Graduate Students in Industrial/ Organizational Psychology (PAGSIP). From eight to 14 ratings were obtained for each set of behavioral incidents. Mean values were computed and those incidents with the most consistent values were selected for use as behavioral examples for the complexity items in the final instrument. The ordinality of responses was also checked to insure that no major reversals were present. (Because of the small number of raters for some items, there was some question of the stability of these ratings. An experimental follow-up with three sets using a group of 36 raters produced mean ratings very close to the original

TABLE 2

OUTLINE OF THE PROFESSIONAL AND MANAGERIAL POSITION QUESTIONNAIRE

Section I - Job Activities	Scale Used
A. Planning/Scheduling	
1. Work scheduling	P*
2. Complexity of scheduling	C**
3. Budgeting	P
4. Complexity of budgeting	C
5. Operations planning	P
6. Complexity of operations planning	C
7. Planning future development	P
8. Complexity of planning future development	C
B. Processing of Information and Ideas	
9. Transcribing/compiling/coding information	P
10. Complexity of transcribing/compiling/coding	C
11. Quantitative processing of information or data	P
12. Complexity of quantitative method	C
13. Analyzing/synthesizing information and ideas	P
14. Complexity of analyzing/synthesizing information and ideas	C
C. Exercising Judgment	
15. Judgments involving people	P
16. Complexity of judgments about people	C
17. Judgments involving operations/objects	P
18. Complexity of judgments about operations/objects	C
19. Judgments involving fiscal resources	P
20. Complexity of judgments about fiscal resources	C
D. Communicating	
21. Oral communications	P
22. Complexity of oral communications	C
23. Written communications	P
24. Complexity of written communications	C
25. Using other languages	P
26. Complexity of use of other languages	C

* Part-of-the-Job
** Complexity
*** Impact
**** Responsibility
***** Special

TABLE 2 (CONTINUED)

E.	Interpersonal Activities and Relationships	
27.	Supervising/directing	P
28.	Complexity of supervising/directing	C
29.	Instructing	P
30.	Complexity of instructing	C
31.	Coordinating	P
32.	Complexity of coordinating	C
33.	Interviewing	P
34.	Complexity of interviewing	C
35.	Advising	P
36.	Complexity of advising	C
37.	Representing/negotiating	P
38.	Complexity of representing/negotiating	C
F.	Technical Activities	
39.	Using equipment and devices	P
40.	Complexity of using equipment or devices	C
41.	Using procedures, techniques, or processes	P
42.	Complexity of using procedures, techniques, or processes	C
G.	Summary Ratings	
43.	Planning/scheduling	P
44.	Processing of information	P
45.	Exercising judgment	P
46.	Communicating	P
47.	Interpersonal activities/relationships	P
48.	Technical activities	P
49.	Planning/scheduling	C**
50.	Processing of information	C
51.	Exercising judgment	C
52.	Communicating	C
53.	Interpersonal activities/relationships	C
54.	Technical activities	C
55.	Planning/scheduling	I***
56.	Processing of information	I
57.	Exercising judgment	I
58.	Communicating	I
59.	Interpersonal activities/relationships	I
60.	Technical activities	I

* Part-of-the-Job
** Complexity
*** Impact
**** Responsibiltiy
***** Special

TABLE 2 (CONTINUED)

61.	Planning/scheduling	R****
62.	Processing of information	R
63.	Exercising judgment	R
64.	Communicating	R
65.	Interpersonal activities/relationships	R
66.	Technical activities	R

Section II - Personal Requirements

A. Personal Development

67.	Formal education required	S*****
68.	Use of education	P
69.	Complexity of education	C
70.	Impact of education	I
71.	Special training required	S
72.	Use of training	P
73.	Complexity of training	C
74.	Impact of training	I
75.	Required relevant experience	S
76.	Use of required experience	P
77.	Complexity of required experience	C
78.	Impact of required experience	I

B. Personal Characteristics

79.	Required personal characteristics	S
80.	Use of personal characteristics	P
81.	Complexity of personal characteristics	C
82.	Impact of personal characteristics	I
83.	Adaptability required	S
84.	Use of adaptability	P
85.	Complexity of adaptability	C
86.	Impact of adaptability	I

Section III - Other Information

87.	Number of nonsupervisory personnel supervised	S
88.	Number of supervisory personnel supervised	S
89.	Total number of personnel	S
90.	Professional group membership	S
91.	Licensing/certification	S
92.	Basis of employment	S
93.	Salary information	S

* Part-of-the-Job
** Complexity
*** Impact
**** Responsibilty
***** Special

values.). The final complexity items used in the PMPQ are shown in Table 2; for a more detained description of this development effort, see Mitchell (1978b).

In addition to Part-of-the-Job and Complexity ratings of job activities, it appeared that additional global assessment of the major activitiy constructs might be worthwhile. Thus, summary ratings of the six activity constructs shown in Table 1 were also included in the final PMPQ. In addition to Part-of-the-Job and Complexity (using a verbally anchored scale without examples), these summary ratings were also extended to include ratings of Responsibiltiy and Impact of Inadquate Performance. By including these latter two types of ratings, it would be possible to experimentally verify whether the Complexity ratings tapped the same information domain. If, for example, there were no significant increase in the prediction of salary when Responsibility ratings were entered into a regression which already included Complexity ratings, then we could assume that the Complexity ratings were an adequate assessment of the responsibility construct.

Traditional background questions (education level, experience, training) were also included in the instrument (see Table 2). To assess the relative value of these "traditional" background questions, experimental ratings of the degree to which these factors were a Part-of-the-Job, their Complexity, and their Impact were also included in the questionnaire. By including the experimental items, it would be possible to assess their potential value over and above the more traditional information. Similar items were developed to also assess the value of information about the Personal Characteristics and Adaptability required in the position.

Finally, a section of the PMPQ was developed which provided objective data on a variety of other information, such as number of persons supervised, professional group membership, and licensing or certification requirements. The final item in the final PMPQ was salary information (as of October 1976), data which could be used as a criterion measure of the value of the position to the company or agency.

FIELD ADMINISTRATION OF THE PMPQ

Development of the Sample

Those individuals participating in the scaling of complexity items were asked if they would also be willing to assist in experimental use of the PMPQ. In addition, those companies and organizations on the mailing list of PAQ Services which had been active in using the PAQ for jobs above the level of first line supervisors were also contacted and requested to participate in this project. From the preliminary contacts with these individuals and organizations, a tentative committment for approximately 950 job analyses using the PMPQ was made. PMPQ booklets were forwarded to 59 individuals who had indicated a willingness to participate in this project.

Final Sample

The final sample consisted of 300 cases from 29 sources in 17 states around the United States. This represents participation by approximately 45 different companies or organizations since some individuals, particularly those who are Industrial/Organizational Consultants, were able to sample several organizations. A complete listing of participants is given in Appendix A.

The sample includes participants from all sections of the country and from a wide variety of industries. A few positions may be in locations outside the United States since at least one company reported that their position to be analyzed were worldwide.

Another reflection of the diversity of the sample can be seen in the various types of industries and organizations included. State personnel and administrative agencies, textile manufacturing and marketing, electronics manufacturing, railroads, aerospace industries, metal and chemical companies, paper product firms, research organizations, educational institutions, health care organizations, military agencies, a photographic processing firm, architects, shipping, federal water and power agencies, and management consultants are all representated in the sample. There is some possibility that the social and psychological sciences are perhaps somewhat overrepresented in the sample since many of the primary contacts are alumni of the Purdue University psychological sciences program. However, the participants attempted to sample various levels and types of jobs and were reasonably successful in doing so.

One index of their success is the salary data which were collected; salaries of positions included in the study ranged from $690.00 per month for an administrative assistant in a small service firm to about $6,800.00 per month for the principal executive of a major organization. Mean salary was $2,070.00 per month with a standard deviation of about $1,000.000 per month. This mean is quite comparable to the present salary of "typical" middle management. Thus, it would appear that the present sample is very representative of the executive, professional, and management salaries of October 1976.

Administration Problems

The final sample of 300 cases represents a return rate of less than 30 percent of the "committed" cases which were to have been included in the study. Part of the difficulty in obtaining a large sample stemmed from the delay in distribution of the final form of the PMPQ. Although scheduled for mailing in early November 1976 to permit the analysis of positions before the end of December, the PMPQ was not finally approved by the research committee until late November. By the time booklets were printed, it was early December before copies of the instrument could be mailed. This created problems for study participants since it so closely encroached on the Christman season. In an effort to provide adequate time for the job analyses to be completed, response time was extended first to January 1977, and subsequently to February 1977. However, even this time frame proved to be inadequate and several of the expected participants found it necessary to cancel their involvement.

Follow-up letters were sent to major participants and finally some telephone contacts were made. At the time when the initial principal components analysis was begun in April, 275 individual records had been received but only 233 of these contained complete information. Additional cases were received in May and June so that 300 records were on file (249 complete) when the regression analysis based on PMPQ items was begun; thus, the size of sample varies in the different analyses which were performed. The final useable sample of 249 cases was not considered sufficient to permit cross validation, but was considered adequate for a basic data analysis. The final analysis was completed in July 1978.

Reliability of Ratings

It was planned to have ten to 15 cases in one participating organization rated by both incumbents and their supervisors so that interrater agreement could be calculated as a rough indicator of reliability. Unfortunately, only three cases were done by more than one rater and this was not an adequate number or provide any realistic estimate. In these three cases, the correlations were .46, .54, and .78. These coefficients reflect only moderate agreement between incumbents and other raters (two supervisors and one independent rater). However, it should be remembered that any index of agreement between raters is confounded with differences in organizational prespective (cf. O'Reilly 1973). Unfortunately, none of the cases in the present study was rated both by an incumbent and by a coworker who might have a similar organizational perspective. Thus, it is not possible with the present data to make any realistic assessment of the reliability of the PMPQ with a correlation coefficient or other index of rater agreement.

Some indication of the reliability of ratings can be obtained via an examination of the consistency of Part-of-the-Job ratings and their related Complexity scales (items 1-42). One of the instructions in the PMPQ notes that, "If a 0 (Does Not Apply) response is chosen for a Part-of-the-Job item, then a zero response is also appropriate for the related Complexity scale which follows." An examination of the response forms was made to examine compliance with this instruction. Of the 300 cases, rating errors of this type were found in nine cases; the most frequently made error involved items 25 and 26, which have to do with the use of other languages.

The overall error rate for this type of error, where specific instructions were not followed, was three percent. This does not seem to be an excessive error rate; however, it does indicate that the instructions for this aspect of the rating process need to be improved or highlighted in some way to give added emphasis to avoiding this type of error.

RESULTS

Analysis Methods

The data collected in the experimental administration of the PMPQ were analyzed using several different approaches. In the initial analysis, an intercorrelation matrix of all variables (excluding salary) was developed. This matrix was submitted to a principal components analysis to identify the basic components or dimensions relevant to higher level positions. A major advantage of principal components analysis is that it is not dependent on a specific criterion such as salary. Thus, the constructs can be interpreted in terms of the patterns of intercorrelations among the items, and remain independent of any relationship that such items might have with salary or any other objective criterion.

Once the principal components have been identified, rotated, and interpreted, their weights may be used to develop principal component scores for each position in the sample. Such scores can then be used in a multiple regression analysis as predictors of salary so that the utility of the various job component constucts can be assessed as estimates of the Level-of-Work.

In addition to the basic principal components analysis and the multiple regression analysis of component scores predicting salary, it should also be possible to graph predicted versus actual salary data and to determine if any significant nonlinear trends exist in the data. The possibility of such functions was suggested by the relative instability of salary prediction for the higher salary level classes in earlier PAQ studies. This trend analysis can be a valuable check on such possibilities.

Some additional data analysis is necessary in order to evaluate the relative utility of various types of rating scales, classes of information, and the additional information collected in the PMPQ. To assess these questions, a multiple regression analysis was performed using sets of items (the Part-of-the-Job items, Complexity items, specific versus summary items, Traditional Background items versus experimental background items, etc.). Salary provides a relative stable, quantified measure of what a job is worth to a company or organization. Thus, it can be used as a criterion of the relative utility of various classes of sets of items in the PMPQ. By using Cohen and Cohen's (1975) hierarchical model, it is possible to test the significance of adding any set of class of variables to the regression against salary. This procedure differs from the usual stepwise regression only in that the steps do not involve each questionnaire item but are taken across sets of items (thus it might more appropriately be called a "setwise" rather than a "stepwise" regression analysis).

Principal Components Analysis

A principal components analysis yielded component weights for PMPQ items for all components which had eigenvalues of 1.0 or greater. This resulted in data on 20 components which were available for interpretation. There is some question as to the value of using a cutoff of 1.0 for eigenvalues (Mulaik 1972). Alernative methods of selecting the number of components for interpretation involve plotting the percentage of variance accounted for by successive components and noting where the resulting curve "breaks" or dips.

When the data from the present study were plotted, there appeared to be breaks in the function after component 6 and after component 10. Thus, it would be possible to interpret the first six components or the first ten. In the present analysis, it was decided to rotate and interpret the first ten components. Since these are by definition orthoginal components, it is still possible at a later time to use fewer components for further research. It is more reasonable to use more components than necessary than to use too few.

Initial interpretation of these ten rotated components is based on the items which have high loadings on each principal component (herafter referred to as PC). Table 3 summarizes these data and gives the name of each PC and the number of items with PC loadings greater than .40.

Although these are orthoginal components, there appears to be some conceptual overlap between some of them. Thus, the first two components both contain an element of decision making or judgement. To attempt to clarify this possible overlap and to further substantiate the components as separate constructs, an alternate method of interpretation was used. In this procedure, cases are sorted by highest component scores. Representative examples are displayed in Table 4 to aid in interpreting the meaning of each component. Graphs showing PC profiles for representative positions are shown in Appendix B.

In general, the data displayed in Tables 3 and 4 provide a rather consistent picture. Items which are related tend to appear together in terms of their component loadings in Table 3 and jobs which have similar job titles seem to group together in terms of component scores in Table 4. There were some problems in terms of seemingly inappropriate positions having high PC scores on PC 10, Other Language Useage. Close examination of the score sheets revealed some rating errors and these cases are excluded from Table 4. In some cases, a position with a given title would appear high on one principal component where a second job in the same firm with a similar title would be high on another principal component. It is not possible to tell, from present data, whether this variance is based on true job differences or whether it may result from differences in the individual workers.

Overall, these ten principal components account for approximately 62 percent of the variance in the table of intercorrelations of PMPQ items. This compares quite favorably with the PAQ, where about 41 percent of the variance was accounted for by five overall dimensions (McCormick, et al. 1972; Table 3). However, this fairly substantial coverage of variances does not permit an assessment of the utility of the principal components. To do this, it is necessary to utilize some criterion and to perform a regression analysis of these components against such a criterion.

Multiple Regression Analysis Using Component Scores

A stepwise multiple regression was performed using principal component scores to predict salary level. This procedure permits the identification of those components which are most valuable in assessing job levels (McCormick et al. 1972).

The results of this analysis are presented in Table 5. The overall prediction of salary results in a multiple correlation coefficient of .68. This is somewhat less than the .85 obtained by McCormick et al. (1972:365)

TABLE 3

INTERPRETED PRINCIPAL COMPONENTS AND REPRESENTATIVE ITEMS
(Number of Items Loading > .40 Shown After Title)

PRINCIPAL COMPONENT	REPRESENTATIVE ITEMS	LOADINGS
I.	Personal Job Requirements (23 Items > .40)	
	79 Required Personal Characteristics	.713
	83 Adaptability Required	.656
	81 Complexity of Personal Characteristics	.634
	45 Exercising Judgements	.604
	58 Impact of Communicating	.518
	15 Judgements Involving People	.478
	56 Processing of Information/Ideas (Summary I)	.460
	37 Representing/Negotiating	.448
	59 Interpersonal Activities (Summary I)	.437
II.	Planning and Decision Making (22 Items > .40)	
	43 Planning/Scheduling (Summary P)	.726
	6 Complexity of Operations Planning	.717
	4 Complexity of Budgeting	.698
	5 Operations Planning	.645
	8 Complexity of Planning for Future Development	.610
	28 Complexity of Supervising/Directing	.603
	89 Total Number of Personnel	.566
	32 Complexity of Coordinating	.564
	63 Exercising Judgement (Summary P)	.416
III.	Complex Analysis and Communication (14 Items > .40)	
	67 Required Education	.710
	24 Complexity of Language in Written Communications	.655
	34 Complexity of Interviewing	.637
	36 Complexity of Advising	.571
	13 Analyzing and Synthesizing Information and Ideas	.450
	87 Number of Nonsupervisory Personnel Supervised	-.415
IV.	Technical Activities (8 Items > .40)	
	40 Complexity of Using Equipment/Devices	.887
	54 Technical Activities (Summary C)	.842
	41 Using Procedures/Techniques/Processes	.604
V.	Processing Of Information/Data (8 Items > .40)	
	11 Quantitative Processing of Information/Data	.673
	44 Processing of Information/Ideas (Summary P)	.597
	12 Complexity of Quantitative Methods Used	.541

TABLE 3 (CONTINUED)

VI.	Relevant Experience (4 Items > .40)	
	76 Use of Experience	.802
	75 Required Revelant Experience	.778
	77 Complexity of Experience	.719
VII.	Interpersonal Activities (5 Items > .40)	
	59 Interpersonal Activities (Summary P)	.558
	53 Complexity of Interpersonal Activities (Summary C)	.537
	15 Judgements Involving People	.403
VIII.	Special Training (4 Items > .40)	
	72 Use of Training	.761
	73 Complexity of Training	.697
IX.	Communicating/Instructing (6 Items > .40)	
	46 Communicating (Summary P)	.587
	29 Instructing	.577
	23 Written Communications	.566
	47 Interpersonal Activities (Summary P)	.563
X.	Second Language Useage (2 Items > .40)	
	26 Complexity Of Use Of Other Language	.733
	25 Use Of Other Language	.568

TABLE 4

REPRESENTATIVE POSITIONS WITH HIGH SCORES ON VARIOUS PRINCIPAL COMPONENTS

PRINCIPAL COMPONENT	POSITION TITLES (TYPE OF FIRM)	PC SCORES
I. Personal Job Requirements		
	Merchandizer/Trader (Food Processing)	2.69
	Management Consultant (Private Consulting)	2.15
	Personnel Officer (Large Utility)	2.08
	President (University)	2.02
	Institutional Salesman (Textile Industry)	1.88
	Graphics Manager (Publishing Firm)	1.62
	Physician (University Clinic)	1.48
	Merchandizing Manager (Mass Retail Firm)	1.21
II. Planning And Decision Making		
	Vice President (Aerospace Corporation)	2.80
	Superintendent (Paper Mill)	2.26
	Director, Operations Services (Public Development Project)	1.75
	Division Comptroller (Paper Firm)	1.72
	Vice President (Community College)	1.69
	Manager, Data Processing (Public Development Project)	1.25
	Plant Manager (Textile Manufacturing)	1.15
	Electronics Technician (Electronics Manufacture)	-2.42
	Plant Personnel Director (Textiles)	-2.93
III. Complex Analysis and Communication		
	Private Physician/Instructor (University)	2.38
	Research Group Manager (Research Foundation)	2.14
	Director, Social Work Education (University)	1.76
	Technical Director (Government Training Research)	1.48
	Owner, Consulting Firm	1.36
	Supervisory Research Psychologist (Government)	1.23
	Industrial Engineer Consultant	1.21
	Shift Supervisor (Textile Manufacturing)	-2.61
	First Mate on Ship (Shipping Line)	-2.91
IV. Technical Activities		
	Dentist/Instructor (Private Practive/University)	2.40
	Supervisor, Computer Programming (Public Development Project)	2.21
	Quality Control Sup. (Photo Processing Company)	2.02
	Shift Supervisor (Weaving Mill)	1.82
	Electrical Engineer (Electronics Manufacturing Co.)	1.68
	Research Psychologist (USAF)	1.50
	Project Leader (Software Design)	1.43
	Research Associate (Biological Research)	1.41
	Regional Sales Manager (Textiles)	-2.06
	Assistant Vice President For Administration (University)	-2.27

TABLE 4 (CONTINUED)

PRINICPAL COMPONENT	POSITION TITLES (TYPE OF FIRM)	PC SCORES
V.	**Processing Of Information/Data**	
	Supervisor, Affirmative Actions (Manufacturing Firm)	2.55
	District Sales Manager (Wood Products Manufacturer)	2.10
	Programmer, Analyst (Mass Retail Merchandiser)	2.09
	Plant Production Control (Textile Firm)	1.75
	Products Manager (Publishing Firm)	1.58
	Research Assistant (Management Consulting Firm)	1.57
	Instructor, Secretarial Sciences (Community College)	-2.31
	Unit President, Statistical Research (Publishing Firm)	-3.55
VI.	**Relevant Experience**	
	Master Electronics Technician (Electronics Manufacturing Firm)	2.44
	Mechanical Project Engineer (Electronics Manufacturing Firm)	1.97
	Occupational Analyst (Federal Agency)	1.87
	Personnel Officer (Federal Water Project)	1.48
	Retail Salesman (Textiles)	1.44
	Director Of Research (Government Research Agency)	1.41
	Industrial Engineering Assistant/Job Loads and Pay Rates (Textile Firm)	1.24
	Owner (Consulting Firm)	-3.78
	Dentist (First Year In Private Practice)	-3.85
VII.	**Interpersonal Activities**	
	Unemployment Insurance Supervisor (State Agency)	2.21
	Division Personnel Officer (Federal Water Project)	2.08
	Division Personnel Officer (Federal Water Project)	2.07
	Personnel Officer, Construction Division (Federal Water Project)	1.75
	Research Assistant, Market Research (Consulting Firm)	1.56
	Director Of Social Work (Medical School)	1.46
	General Accountant (Textile Manufacturing Firm)	-2.39
	Division Controller (Mass Merchandizer)	-2.39
	Electrical Engineer (Electronics Manufacturing Firm)	-2.97
VIII.	**Special Training**	
	General Accountant, Industrial Fabrics (Textiles)	2.41
	Physician/Instructor (State Medical School)	1.54
	Group Leader, Development and Engineering (Electronics Manufacturing)	1.11
	Vice President (Aerospace Industry)	-3.94
	Director, Affirmative Actions (Community College)	-4.04

TABLE 4 (CONTINUED)

PRINCIPAL COMPONENT	POSITION TITLES (TYPE OF FIRM)	PC SCORES
IX. Communicating/Constructing		
	Manager, Education and Training (Electronics Manufacturer)	2.38
	Director (Consulting Firm)	1.79
	Instructor, Office Services (Community College)	1.74
	Director Training and Development (Chemical Processing Firm)	1.54
	Division Controller (Wood Products Firm)	-2.53
	Director of Services (Photoprocessing Laboratory)	-2.91
X. Second Language Useage		
	General Manager, International Operations (Chemical Firm)	2.47
	Treasurer (Federal Development Project)	2.38

TABLE 5

REGRESSION OF ROTATED PRINCIPAL COMPONENTS ON SALARY

COMPONENT NUMBER	COMPONENT NAME	R	CHANGE IN R^2	R^2 (CUM)	$\bar{R}^2$ (CUM)
II.	Planning and Decision Making	.389	.151*	.151*	.147*
III.	Complex Analysis and Communication	.496	.095*	.246*	.239*
VI.	Relevant Experience	.577	.087*	.333*	.324*
I.	Personal Job Requirements	.623	.056*	.387*	.378*
IV.	Technical Activities	.658	.044*	.432*	.420*
V.	Processing of Information/Data	.666	.010*	.443*	.428*
X.	Second Language Usage	.673	.010*	.453*	.436*
VIII.	Special Training	.679	.008	.461*	.442*
IX.	Communicating/Instructing	.680	.002	.463*	.441*
VII.	Interpersonal Activities	.682	.002	.465*	.441*

$\bar{R}^2$ = "Shrunken" R^2 (using the Wherry Formula) = predicted R^2 in population
* Significant at $p = .05$

using the five overall PAQ components. However, considering that the present instrument is approximately half the length of the PAQ and that the sample is restricted to executives, managers, and professionals, this level of prediction may be understandable.

In the McCormick et al. study, regression weights derived on two subsamples were cross validated with little or no shrinkage. In the present study, a second sample was not available and, given the diverse types of jobs and organizations included in the sample, it was deemed unwise to split the sample. However, an estimate of the shrinkage which could be expected in practical use can be obtained through the use of a "shrunken" or "adjusted" R. These coefficients are also given in Table 5 and, as can been seen, very little shrinkage is evident. Even the adjusted coefficients are all statistically significant, which suggests that the component scores have considerable utility in the prediction of salary levels.

In general, the first six components account for most of the prediction; of the remaining components, only PC X (Second Language Useage) makes a significant contribution. However, as was discussed earlier, this component involves some unrealistic ratings (errors in rating) and the significance of this contribution may be spurious. Thus, only the first six components can be considered valid predictors of salary level. This result suggests that little information would have been lost if only six factors had been rotated and interpreted. Thus, the criterion of using the first break in the plotted eigenvalues curve to select components (rather than a criterion of an eigenvalue of 1.0 or greater) would have been a valid procedure for the present study.

Trend Analysis Using Principal Component Prediction of Salary

To examine more specifically the issue of nonlinear components and any systematic under or over prediction of salary levels, it is worthwhile to group the predicted salary data by classes. This is analogous to the data analysis performed by Mecham and McCormick (1969; Appendix D). Table 6 displays, by salary class, the systematic trends to be found in the data.

These data suggest that there is some overall inflation of ratings (60 percent where predicted salary based on component scores is greater than actual salary versus 40 percent underprediction). It is obvious, however, that this is in part a function of the level of actual salary. This may be a case of classic regression toward the mean since the upper levels are underpredicted and the lower levels are overpredicted from principal component scores. However, these data also suggest some possibility of systematic bias in the basic data (PMPQ ratings) since the lowest jobs are "over-rated" and the highest jobs are "under-rated". It could also suggest that a strictly linear regression is perhaps not the optimum prediction system, since there are systematic deviations at the extremes. In future research we need to look at the possibility of using cross product terms or powered terms in the prediction of the criterion.

This trend analysis was based on the prediction of salary levels from the ten principal component scores. While such data permit the evaluation of the prediction of salary by PC scores, they do not facilitate the examination of the various types of items which have been included in the PMPQ. To examine

TABLE 6

TREND ANALYSIS, SALARY PREDICTION BY SALARY CLASS

ACTUAL SALARY CLASS	N	PREDICTED < ACTUAL SALARY	PREDICTED > ACTUAL SALARY	PERCENT UNDER	PERCENT OVER
$5,000+	8	8	0	100	0
4,500-5,000	0	0	0	0	0
4,000-4,500	1	1	0	100	0
3,500-4,000	7	6	1	85	15
3,000-4,500	17	15	2	88	12
2,500-3,000	26	14	12	54	46
2,000-2,500	48	20	28	42	58
1,500-2,000	51	13	38	25	75
1,000-1,500	50	12	38	24	76
500-1,000	17	2	15	12	88
TOTAL	225*	91	134	40%	60%

* Excludes 8 cases where actual minus predicted salary was plus or minus $30 or less

the relative value of specific items and the types of rating scales which were experimentally included, a multiple regression analysis using salary predictions based on various sets of items is required.

Multiple Regression Analysis Using Sets of PMPQ Items

The ultimate objective in this data analysis is to develop a comprehensive picture of the relative value of the various types of ratings and classes of variables which were included in the PMPQ. For this analysis, 249 cases were available which contained all ratings plus salary information. Some of the companies and individuals who participated did not provide salary data for this research.

The results of this setwise multiple regression analysis are shown in Table 7. Key columns in this display are the "Set Contribution to R^2" and the F values given to the right side of the table.

As is evident in Table 7, the descriptive Part-of-the-Job items made a significant contribution to the prediction of salary, as did the Complexity items, one of the four sets of Summary Ratings, Traditional Background data, and Other Information. A key finding here, is that the Complexity ratings, when added to a regression already containing the descriptive Part-of-the-Job items, accounted for over eight percent additional variance. This suggests that Complexity ratings may give an additional dimension of information over and above that developed through descriptive data; it implies that multiple ratings of activity areas may be fruitful areas for future research.

Only one of the four sets of summary ratings made a significant contribution to the prediction of salary. This raises the question of an order effect and implies we might obtain different results if the sets of variables were entered in a different order. To test this possibility, several alternative orders were used and the results of this analysis are displayed in Table 8. The original order (used in Table 7) is given to the left of Table 8 and three alternative orders are shown in the main body of the table. Individual F tests are not displayed however, from the earlier analysis (Table 7) we know that a set accounting for about four percent of the variance was significant (at $p = .05$) where sets accounting for two percent or less of the variance were not significant predictors.

When the Summary sets (3, 4, 5, and 6) are entered first into the regression, they jointly account for 38 percent of the variance in salary and three of the four sets make significant contributions to the R^2. When the same four sets are entered last, they jointly account for about five percent of the variance. When entered before the two most significant sets (1 and 2) but after background data and other information, these summary sets still account for only about 5 percent of the variance. In this regression, their order was reversed (6, 5, 4, and 3) to test the effect of order on their relative contribution. As can be seen in the data displayed, the magnitude of the contribution of each of these Summary sets did change, which implies that there is indeed an order effect. From this result, it is possible to conclude that the initial significant result for the Summary Part-of-the-Job set (in Table 7) is spurious in the sense that it is partially a function of set order.

TABLE 7

SET-WISE MULTIPLE REGRESSION OF PMPQ ITEMS AND SALARY

SET	VARIABLES (ITEMS)	CONTENT AREA	SET R WITH SALARY	R^2 (CUM)	$\bar{R}^2$ (CUM)	CHANGE IN R^2	df 1/ df 2	F RATIO
1.	Part-of-the-Job (1,3,5,...41)	Job Activities	.455	.455	.404	.455	21/227	9.008*
2.	Complexity (2,4,6,...42)	Job Activities	.428	.541	.447	.086	21/206	1.836*
3.	Part-of-the-Job (43 - 48)	Summary Ratings	.219	.591	.493	.051	6/200	4.151*
4.	Complexity (49 - 54)	Summary Ratings	.237	.610	.502	.019	6/194	1.557
5.	Impact (55 - 60)	Summary Ratings	.238	.630	.512	.020	6/188	1.702
6.	Responsibility (61 - 66)	Summary Ratings	.264	.641	.511	.011	6/182	.942
7.	Traditional (67,71,75,79,& 83)	Background Data (i.e., Education, Training, etc.)	.371	.689	.564	.047	5/177	5.385*
8.	Part-of-the-Job (68,72,76,80,& 84)	Background Data	.156	.699	.566	.011	5/172	1.206
9.	Complexity (69,73,77,81,& 85)	Background Data	.212	.710	.570	.011	5/167	1.301
10.	Impact (70,74,78,82,& 86)	Background Data	.242	.717	.567	.007	5/162	.781
11.	Specific Data (87-92)	Other Information (i.e., Number supervised, etc.)	.379	.776	.644	.058	6/156	6.747*
						.776	92/156	5.88138*

R of Set With Salary = Multiple Correlation of Set of Variables with Salary

$\bar{R}^2$ = "Shrunken" R^2 (using the Wherry Formula) = predicted R^2 in population

* Significant at p = .05 (Winer 1971: Table C.3)

TABLE 8

ALTERNATIVE REGRESSIONS OF PMPQ SETS ON SALARY

ORIGINAL SET				ALTERNATIVE ORDER A			ALTERNATIVE ORDER B			ALTERNATIVE ORDER C		
SET		CHANGE IN R^2	CUM R^2	SET	CHANGE IN R^2	CUM R^2	SET	CHANGE IN R^2	CUM R^2	SET	CHANGE IN R^2	CUM R^2
1.	Part-of-the-Job	.455	.455	3.	.219	.219	7.	.371	.371	11.	.379	.379
2.	Complexity	.086	.541	4.	.089	.308	8.	.023	.394	7.	.155	.534
3.	Summary (P)	.051	.591	5.	.027	.335	9.	.012	.406	8.	.020	.554
4.	Summary (C)	.091	.610	6.	.046	.381	10.	.025	.431	9.	.013	.567
5.	Summary (I)	.020	.630	7.	.144	.525	11.	.154	.585	10.	.019	.586
6.	Summary (R)	.011	.641	8.	.007	.532	1.	.094.	.679	6.	.027	.623
7.	Background	.047	.689	9.	.007	.539	2.	.051	.720	5.	.011	.634
8.	Background (P)	.011	.699	10.	.016	.555	3.	.024	.744	4.	.013	.647
9.	Background (C)	.011	.710	11.	.098	.653	4.	.013	.757	3.	.006	.653
10.	Background (I)	.006	.717	1.	.079	.732	5.	.013	.770	2.	.057	.710
11.	Other Information	.059	.776	2.	.044	.776	6.	.006	.776	1.	.066	.776

The initial 42 items of the PMPQ (sets 1 and 2, Part-of-the-Job and Complexity across specific activities) mutually account for 54 percent of the variance in the initial regression. When entered after the Background data (sets 7 - 10) and Other Information (set 11), these 42 items still account for 14½ percent of the variance. Even when entered at the end of the regression, they jointly account for more than twelve percent of salary variance, which suggests that they have substantial utility.

Traditional Background variables (set 7) accounts for approximately 37 percent of salary variance when entered first. This drops to 15½ percent when entered after Other Information (set 11), 14½ percent when entered after the Summary variables (sets 2, 4, 5, and 6), and to about five percent when entered in the original order. The experimental Background items (sets 8, 9, and 10) remain very poor predictors of salary regardless of where they enter the regression. This appears to substantiate the much greater utility of the traditional types of background information (such as years experience, level of education, etc.) over the experimental variables (such as rating the degree to which experience or education is a Part-of-the-Job, etc.).

Other Information (set 11) accounts for 38 percent of salary variance when the set is entered first. This drops to 15 percent when entered after sets 7 through 10, and about ten percent when entered near the end of the regression. All of these are significant contributions as was the six percent contribution this set made when entered at the very end of the equation. This set includes items 87 through 92. Items 87, 88, and 89 involve the number of workers supervised, number of supervisory personnel supervised, and total number of personnel in the organizational unit for which the incumbent is responsible. These items are directly equivalent to items 128, 129, and 130 in the PAQ except that the rating scales were expanded to 9-point scales. The other items in set 11 are categorical variables including whether professional group membership is required (PMPQ item No. 90), the need for licensing or certification (item 91), and the Basis of Employment (self employed, private industry, government, or nonprofit organization - item 91). Apparently, all these kinds of information are relevant to the prediction of salary. However, the interpretation of the final three items, which are categorical variables, is somewhat more complicated than for other PMPQ items.

Item 92, Basis of Employment, had a zero-order correlation of -.0385 with salary and, yet, in the final regression against salary, it accounts for more than one percent of the variance. Its standardized regression (Beta) weight has a value of -.14968. Since the Beta weight is the same sign as the zero order correlation but is considerably larger, we can postulate that this variable is functioning as a moderator (Cohen and Cohen 1975). This implies that somewhat better prediction could be obtained by developing separate regression equations for the various categories of employement, or by dummy coding these categories as an initial step in developing a mixed regression model.

This setwise multiple regression analysis has demonstrated several things. It has clearly substantiated the value of both descriptive (Part-of-the-Job) and evaluative (Complexity) ratings of jobs. It was also demonstrated that summary items dealing with generic categories of information were of limited value; this probably stems from the order in which they were entered into the regression and, thus, has very limited utility. It should be

noted that the specific activitiy Complexity items had value where the rating scale was anchored with behavioral examples; yet the Summary Complexity items which used a simple verbal anchoring were of little value. This result suggests that the work involved with developing specific examples to serve as a common frame of reference for raters was probably very worthwhile.

It has also been demonstrated that the traditional background variables were valuable in the prediction of salary where the experimental forms of background information were not. Finally, the information included in the Other Information section was also valuable; particularly the categorical variable dealing with the type of employment, which was probably functioning as a moderator variable.

The review of several possible alternative orderings of sets of PhPQ items clarified the relative value of all of the sets. From the initial setwise regression and from the alternative order regressions, it is reasonable to conclude that sets 1, 2, 7, and 11 are the most useful in the prediction of salary. Although significant in the initial regression order, set 3 (Summary - Part-of-the-Job) proved to be spurious in the sense that its significant contribution was probably a function of its order of entry into the regression equation.

DISCUSSION AND CONCLUSIONS

The results of a principal components analysis of the items in the PMPQ suggest that managers, executives, and professionals can be meaningfully differentiated on the basis of a number of dimensions. These include activity dimensions, such as planning and decision making, as well as dimensions which involve the background or preparation of the individual for the position, such as experience or training. The most important of these dimensions, at least in terms of its relation to salary levels, is the Planning and Decision Making component (see Appendix B). This component seems to most clearly differentiate the more executive types of positions, while other components appear to better characterize other types of higher level positions (for example, most of the sales and consultant jobs tended to be high on the first component - Personal Job Requirements).

In general, the principal component analysis suggested that most of the items in the PMPQ were valuable; however, additional analysis of the Summary ratings and the experimental background items failed to substantiate their value. Thus, it would appear that the Summary items and the experimental background variables could be eliminated without substantially changing the principal component structure of the instrument.

It has been demonstrated that using Part-of-the-Job ratings to characterize higher-level positions can be valuable. The addition of other types of ratings, such as Complexity of an activity, Background data, and Other Information, can significantly increase the prediction of salary and, by inference, make for more complete description of the positions. The maximum prediction of salary with all 92 PMPQ items was .881, which represents about 75 percent of the variance in salary level. Shrinking this multiple correlation to estimate the relationship in the population reduces it to .80. This result is fairly comparable to the predictability to be found with other, longer instruments. However, even with such comparable utility, the present research version of the PMPQ is apparently too long; some participants report considerable difficulty in completing the questionnaire in less than 2½ hours and some report taking as much as 4 hours. If it is to prove useful in the study of executive, professional, and managerial positions, the PMPQ must be shortened so that a typical executive or professional could complete it in about an hour.

Overall, while the present instrument may need refinement, none-the-less, the use of multiple ratings across specific job activities (as opposed to using only a single multidimensional scale for all types of constructs as was done by Hemphill 1959, or Baehr 1967, or others) appears to be not only possible but also to have considerable value.

One limitation of the present study results from the use of a single criterion (salary). While this does not effect the results of the principal components analysis, all of the regression analyses made use of this single criterion. While the salary data appears to have a satisfactory range and mean, the standard deviation of about $1,000 implies a skewed distribution (this skew can be seen in Table 6). Such skewed data would, if anything, suppress the R^2 value; however, the key issue here is that this salary data alone may not provide a sufficient range of criteria against which to evaluate the utility of multiple ratings, types of information, etc.

To extend the generality of results, the PMPQ needs to be tested against other criteria (such as performance measures, objective production data, etc.) and used with other samples. These types of replication and generalization studies would either confirm the findings of this research or would result in formulating futher research questions to develop and refine this instrument.

The PMPQ should also be used in conjunction with other types of job analysis instruments (such as the PAQ, EPDQ, etc.) to further clarify the dimensions it measures, assess their overlap with constructs measured in other instruments, and test for possible ommission of important areas. While there is no way to completely resolve the issue of omission, some measure of the comprehensiveness of the PMPQ could be achieved through its use with a battery of existing questionnaires. If tested against a series of criteria (salary, performance, individual and unit production data, job satisfaction, etc.), a more comprehensive picture of the nature and of the relative utility of the PMPQ could be achieved.

While the present study has been successful in demonstrating the relative value of several types of quantitative job information in the study of higher level jobs, it represents only the bare beginnings of what should be a continuing program of research to further our understanding of the world of executive, professional, and managerial positions. The present approach, based largely on the recommendations of Campbell, Dunnette, Lawler, and Weick (1970) and on the very substantial program of occupational research undertaken in the development of the Position Analysis Questionnaire by McCormick, Jeanneret, and Mecham (1972), appears to be a useful methodology for analyzing and evaluating higher level positions.

ADDENDUM: OTHER RESEARCH WITH THE PMPQ

During the spring and summer of 1978 while oral exam and subsequent rewriting of the research report were underway, Dr. Randall B. Dunham of the University of Wisconsin requested permission to use the PMPQ in some research. Dunham (Research Note 1) had been conducting a study of job evaluation methods and had contrasted the PAQ with the Managerial Position Description Questionnaire (MPDQ) of Tornow and Pinto (1976). He found that the PAQ underpredicted high level jobs and the MPDQ underpredicted low level jobs; however, there was a high degree of convergence and the overall correlation of job evaluation scores ranged from .72 to .85. This research was reported at the 1978 APA convention in Toronto.

In a second study (Research Note 2), Dunham compared the PMPQ to the Position Description Questionnaire (PDQ) a modified version of Tornow and Pinto's MPDQ, and found that these two instruments converged on managerial responsibility dimensions. The PMPQ appeared to also tap additional dimensions involving professional work. A series of hospital jobs were evaluated using the PMPQ and a perfect rank order correlation was found between job evaluation points and actual average compensation. Dunham concluded that the PMPQ performed well in constructing an integrated compensation structure for a series of managerial and professional jobs for in-home nursing organizations.

In a third study, Dunham studied over 300 administrators, technicians and nursing professionals from 63 organizations involved in nursing services and in six hospitals (Research Note 3). Both the PDQ and PMPQ were used to analyze each postion. In this study, Dunham concluded that there was moderately high level of convergence for several of the dimensions measured by the two dimensions; however, there was a general lack of convergence for dimensions which tapped professional as opposed to managerial factors. Job evaluation scores based on the two systems showed good convergence for administrative jobs but not for the professional technician or nursing jobs. Dunham concluded that the PMPQ was a potentially valuable instrument for job analysis and job evaluation.

RESEARCH NOTES

Research Note 1 - Dunham, Randall B. Job evaluation: two instruments and sources of pay satisfaction. Manuscript study reported to Division 14 of the 1978 convention of the American Psychological Association, Toronto, Canada, September 1978.

Research Note 2 - Dunham, Randall B. Job evaluation: two methods -- a health services study. Draft report, Graduate School of Business, University of Wisconsin at Madison, undated.

Research Note 3 - Dunham, Randall B. Compensation evaluation study: home health agencies in Illinois, Administrative jobs. Draft report presented to the 1979 Midwest Psychological Association convention, Chicago, May 1979.

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APPENDIX A

Participants in the PMPQ Project

APPENDIX A

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Boise ID

Dr Richard J. Klimoski
The Ohio State University
Columbus OH

Dr John M. Larsen, Jr.
University of Tennessee
Knoxville TN

Dr Lloyd D. Marquardt
Sears, Roebuck and Company
Chicago IL

Dr Robert Mecham
Utah State University
Logan UT

Dr Paul Muchinsky
Iowa State University
Ames IA

Dr Jarold R. Niven
Boeing Company
Seattle WA

Dr James E. Oliver
GM Corporation
Dearborn MI

Dr Donald D. Penner
US Army War College
Carlile Barracks PA

Dr Larry Peters
University of Texas at Dallas
Richardson TX

Dr Patrick R. Pinto
Industrial Relations Center
University of Minnesota
Minneapolis MN

Dr Ned Rosen
Department of Organizational Behavior
Cornell University
Ithaca NY

Dr Richard K. Rosensteel
Ford Motor Company
Dearborn MI

Dr William J. Saunders, Jr.
Middletown OH

Dr Charles D. Scheips
West Hartford CT

Dr Lyle F. Schoenfeldt
Albany NY

Dr Peter Schoenemann
Dept of Psychological Sciences
Purdue University
West Lafayette IN

Dr B. J. Winer
Dept of Psychological Sciences
Purdue University
West Lafayette IN

APPENDIX A

Section II - Participants in the Experimental Use of the PMPQ

Dr Albright	Kaiser Aluminum & Chemical Co	Oakland CA
Dr Ammerman	Center for Vocational Education	Columbus OH
Dr Askren	Advanced Systems Division, AFHRL	Wright-Patterson OH
Dr Besnard	California State University	Chico CA
Mr Bravard	Fels Institute	Yellow Springs OH
Mr Brott	Elementary School Principal	Eugene OR
Dr DeLeo	Technical Training Division, AFHRL	Lowry AFB CO
Mr Dertien	Salt River Project	Phoenix AZ
Dr Fisher	Hay Associates	Rockville MD
Dr Frazier	Tektronix, Inc	Beaverton OR
Dr Golden	H-M Consulting	Minneapolis MN
Mr Hill	Wm Hill & Associates	Oxford OH
Mr Ingram	West Point Pepperill	West Point GA
Dr James	Univ of Texas Health Care Center	Dallas TX
Dr Jeanneret	Lifson, Wilson, Ferguson & Winick	Houston TX
Dr Jeswald	R.R. Donnelley & Sons	Chicago IL
Mr Jones	Interior Architect	Vashon WA
Dr Kavanagh	State University of New York	Binghamton NY
Mr King	Union Camp Corporation	Franklin VA
Ms Kutie	Lakeland Community College	Mentor OH
Mr Levine	Arizona Dept of Administration	Phoneix AZ
Dr McDaniel	University of Southern Mississippi	Hattiesburg MS
Dr Niven	Boeing, Inc	Seattle WA
Ms Rojowski	Indiana State Personnel Division	Indianapolis IN
Mr Ruck	USAF Occupational Measurement Center	Lackland AFB TX
Mr Spurlin	Tennessee Valley Authority	Knoxville TN
Dr Walsh	American Appraisal Company	Chicago IL
Mr Wilson	Chicago & Northwestern Railroad	Chicago IL
Mr Winkler	Winkler & Associates	Peoria IL

APPENDIX B

Principal Component Profiles of Sample Jobs

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

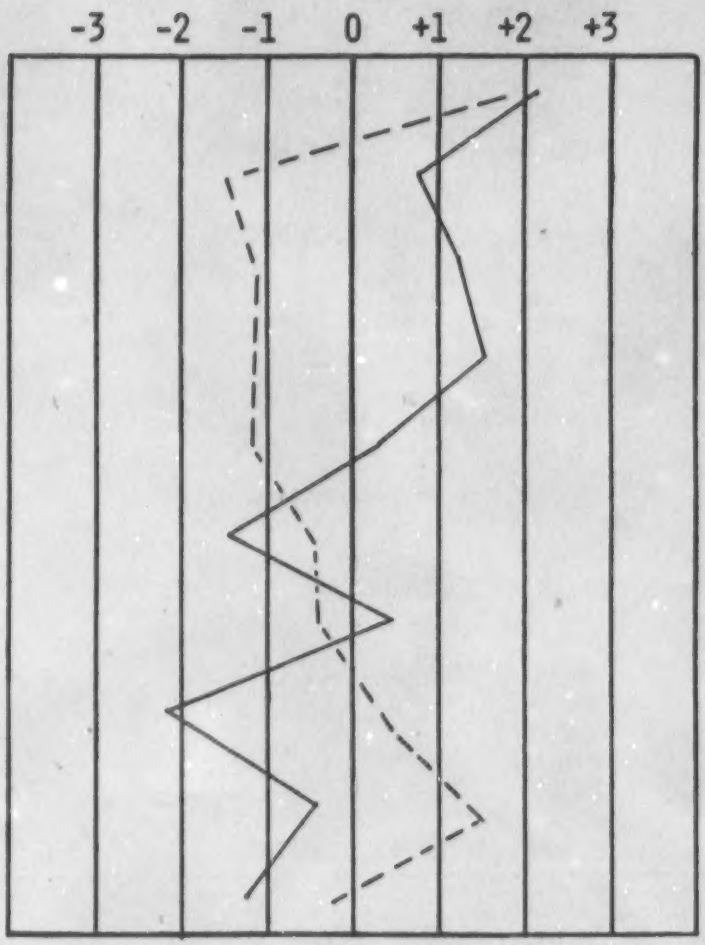
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = PERSONNEL OFFICER, OF UTILITY

DASHED LINE = INSTITUTIONAL SALESMAN FOR TEXTILE FIRM

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC I, PERSONAL JOB REQUIREMENTS

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

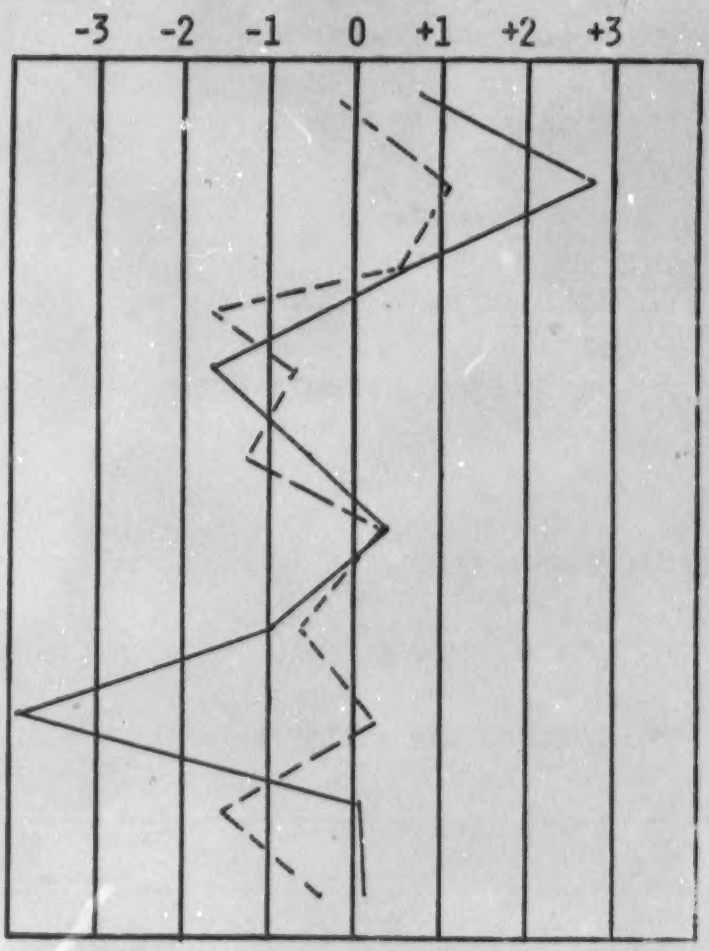
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = VICE PRESIDENT, AEROSPACE CORP.

DASHED LINE = PLANT MANAGER, TEXTILE FIRM

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC II, PLANNING AND DECISION MAKING

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

VI. RELEVANT EXPERIENCE

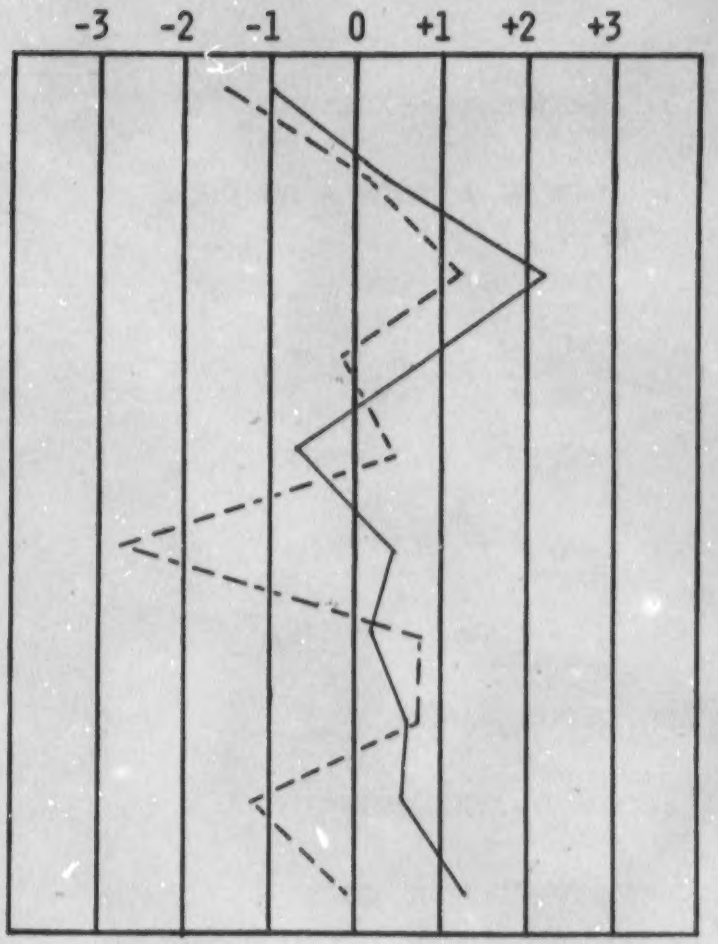
VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE

P C SCORES



SOLID LINE = RESEARCH MANAGER, FOUNDATION

DASHED LINE = INDUSTRIAL ENGINEERING CONSULTANT

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC III, COMPLEX ANALYSIS

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

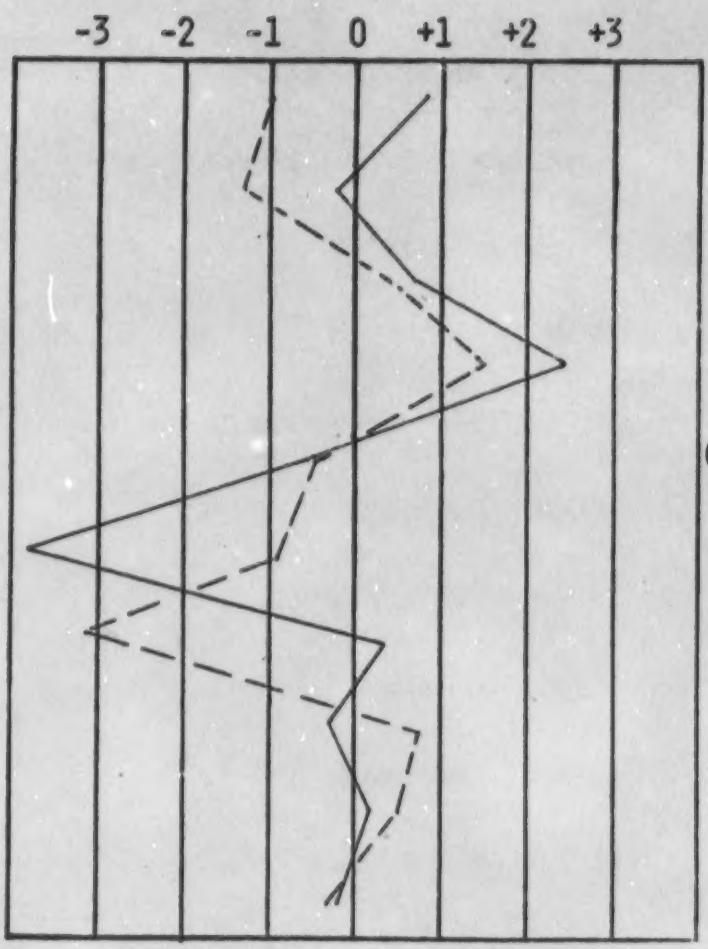
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = DENTIST, FIRST YEAR OF PRACTICE

DASHED LINE = BIOLOGICAL RESEARCH ASSOCIATE

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC IV, TECHNICAL ACTIVITIES

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

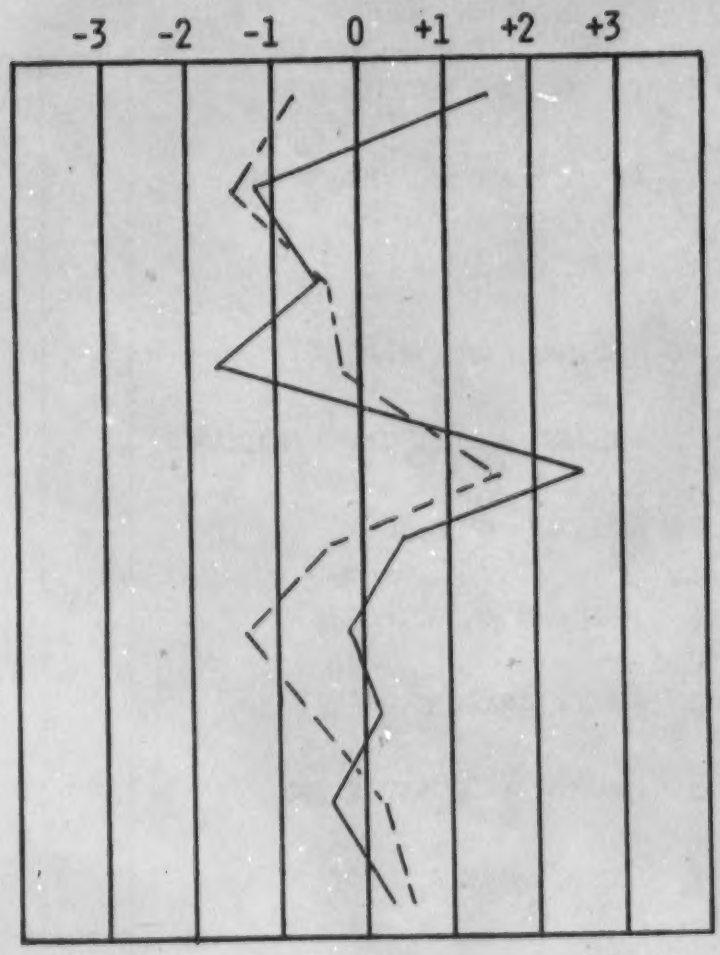
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = AFFIRMATIVE ACTIONS SUPERVISOR

DASHED LINE = RESEARCH ASSISTANT, CONSULTING COMPANY

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC V, PROCESSING OF INFORMATION AND IDEAS

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

VI. RELEVANT EXPERIENCE

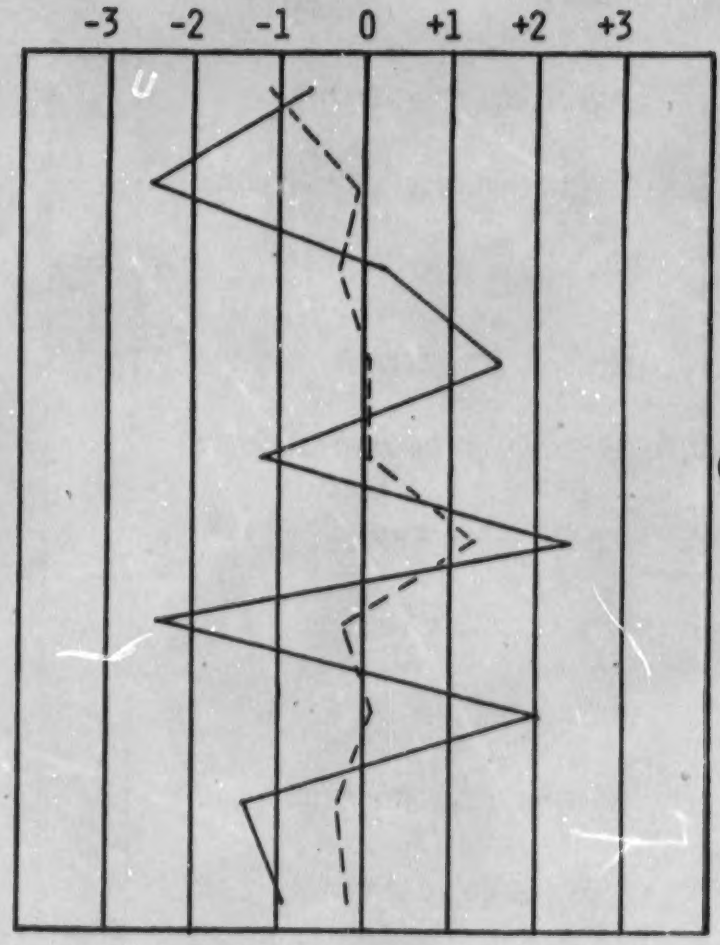
VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE

P C SCORES



SOLID LINE = MASTER ELECTRONICS TECHNICIAN

DASHED LINE = TECHNICAL ASSISTANT, WAGE AND PRICE SETTING

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC VI, RELEVANT EXPERIENCE

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

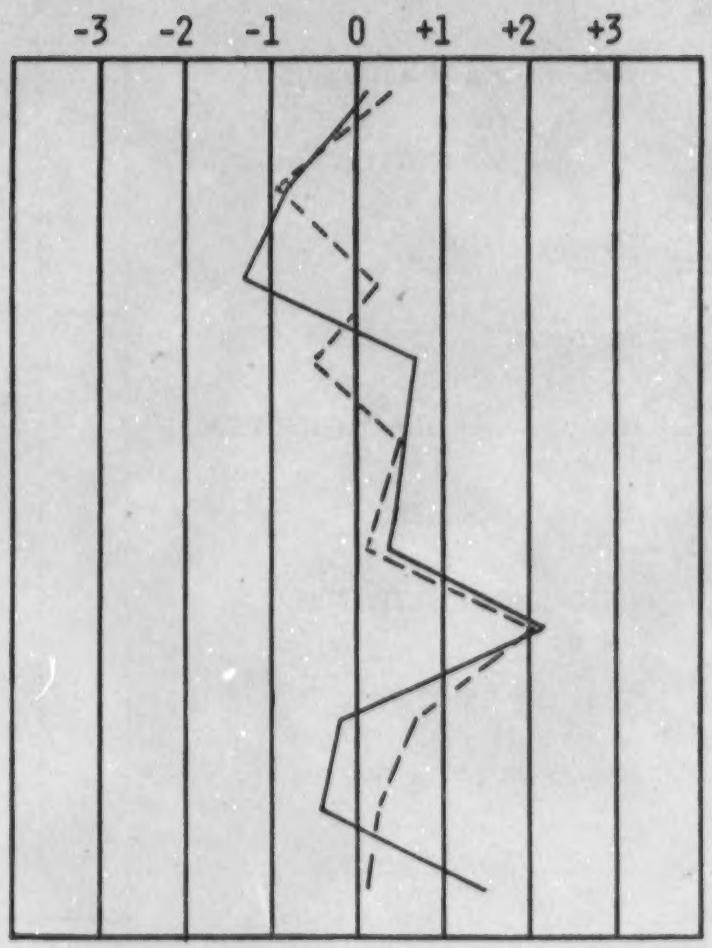
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = UNEMPLOYMENT SUPERVISOR, STATE

DASHED LINE = PERSONNEL OFFICER, UTILITY

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC VII, INTERPERSONAL ACTIVITIES

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

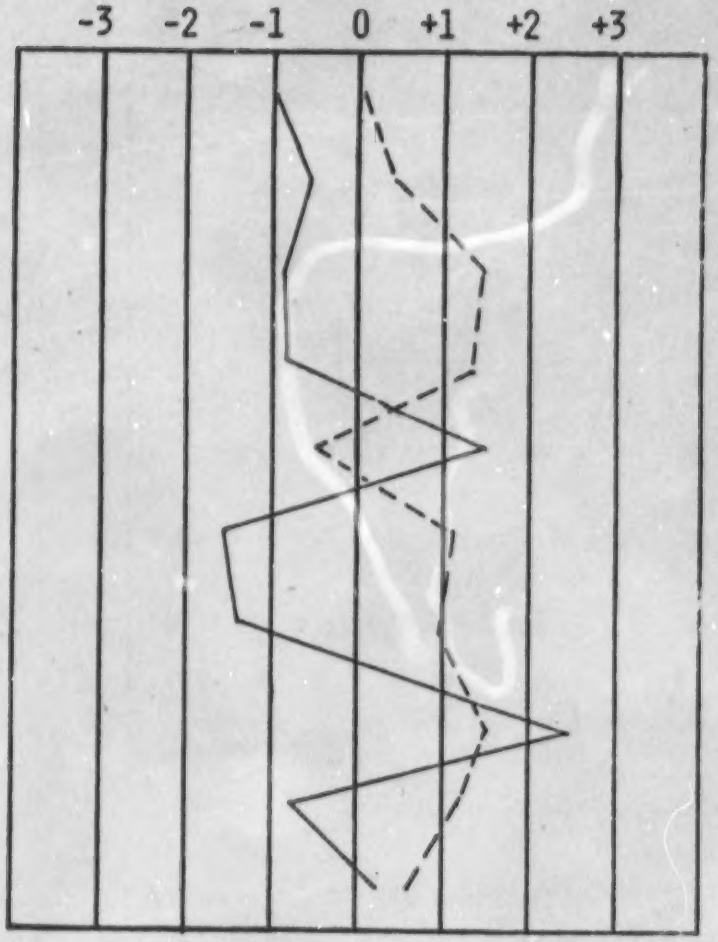
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = GENERAL ACCOUNTANT, TEXTILE FIRM

DASHED LINE = PHYSICIAN - INSTRUCTOR

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC VIII, SPECIAL TRAINING

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

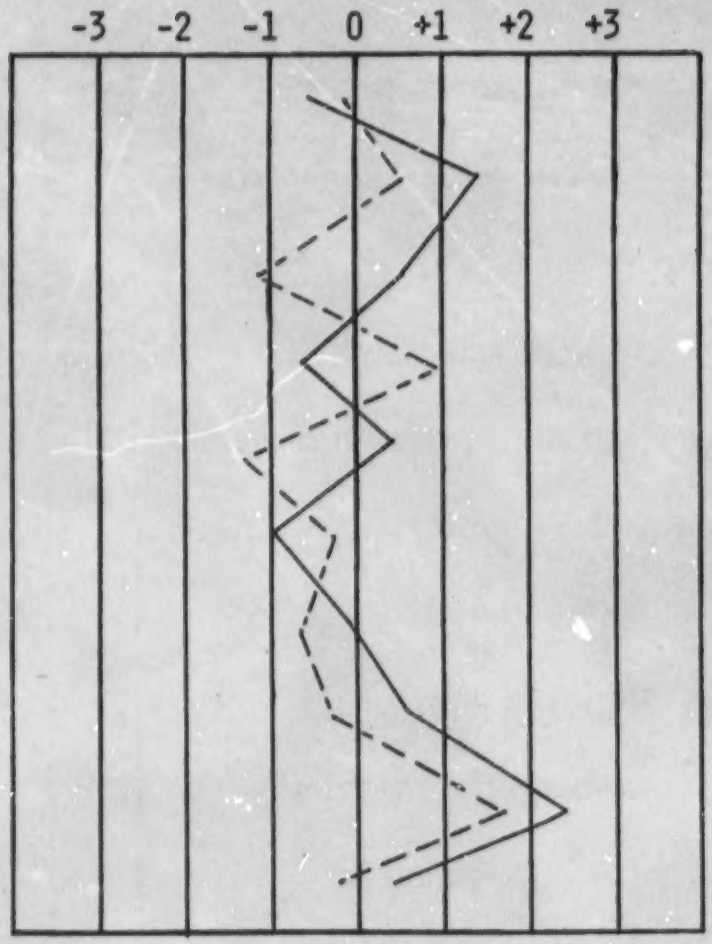
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USAGE



SOLID LINE = EDUCATION AND TRAINING MANAGER

DASHED LINE = INSTRUCTOR OF OFFICE SERVICES, COMMUNITY COLLEGE

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC IX, COMMUNICATING/INSTRUCTIN

P M P Q PROFILE

PRINCIPAL COMPONENTS

I. PERSONAL JOB REQUIREMENTS

II. PLANNING AND DECISION MAKING

III. COMPLEX ANALYSIS

IV. TECHNICAL ACTIVITIES

V. PROCESSING OF INFORMATION/IDEAS

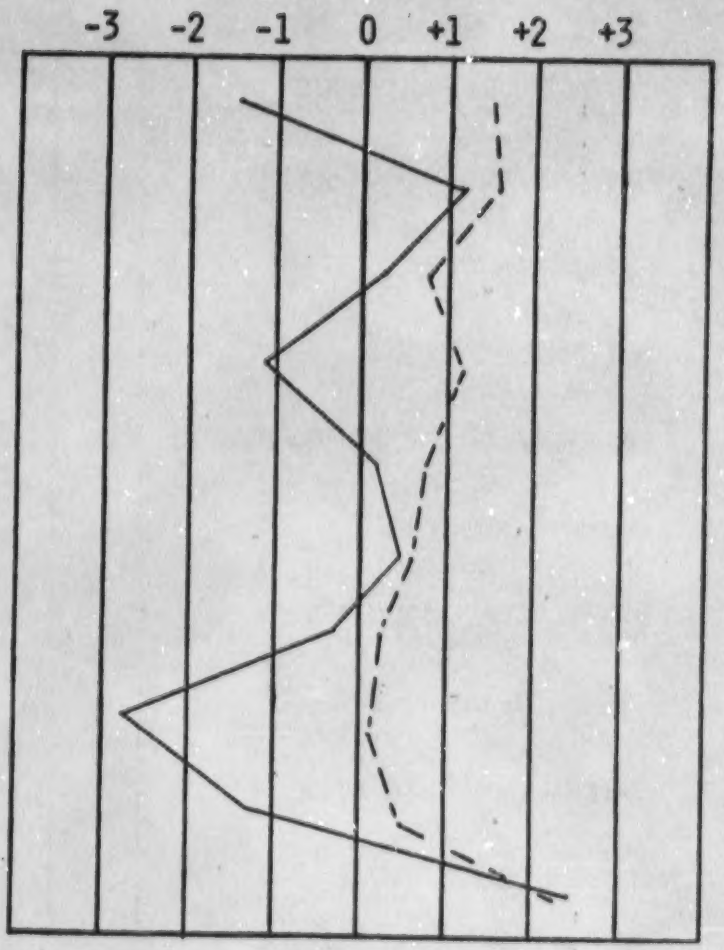
VI. RELEVANT EXPERIENCE

VII. INTERPERSONAL ACTIVITIES

VIII. SPECIAL TRAINING

IX. COMMUNICATING/INSTRUCTING

X. SECOND LANGUAGE USEAGE



SOLID LINE = MANAGER, INTERNATIONAL OPERATIONS

DASHED LINE = TREASURER, FEDERAL DEVELOPMENT PROJECT IN SOUTHWEST U.S.

POSITIONS REPRESENTATIVE OF HIGH SCORES ON PC X, SECOND LANGUAGE USEAGE